EMBO reports

editorial

The essential role of peer review

An essential aspect of the scientific process in the life sciences is the thorough examination of manuscripts by other scientists. They read the article critically and then either suggest that it is accepted, rejected, or—most frequently—revised and improved before it is published. In fact, most scientists will not consider a scientific pronouncement as valid unless it has been approved by this anonymous process, known as peer review. Without such an external seal of approval, they would consider any results presented as preliminary, potentially flawed and generally of the same self-serving status as a press release.

But the need for peer review has recently been questioned. With the advent and growth of electronic media came a new philosophy, which asserts that everybody should be free to publish as they wish and that the 'readers' can decide for themselves if the article has scientific value. In fact, there are some aspects to the peer review process that have always drawn criticism. Many view the powerful role that reviewers play in scientific publishing with suspicion, and feel that the anonymity of the process is contrary to the current demands for transparency. Peer review also has an elitist aspect that is easily attacked. Furthermore, some people, being aware of alternatives in the physical sciences, for instance, think that peer review may indeed no longer be essential to ensure that there is adequate quality control on the output of scientists. However, I think that all arguments made against peer review are ultimately wrong. What is needed is indeed more, not less, quality control and the involvement of the best scientists in order to ensure that there is genuine reviewing by peers.

Peer review is not without flaws. Those who evaluate papers are not infallible and often work under time constraints that militate against perfection. Sometimes the person selected by the editor is not the perfect match for the topic under review. Sometimes they are not really peers in the sense of being of sufficiently high scientific quality. I am also aware of the misuse of the system by organisations claiming that their award decisions are made on the basis of 'international peer review'. When the composition of the panels become known it is often obvious that such a claim is false; a review board in which non-scientists judge scientific content is not real peer review. Those may be necessary to fulfil some non-scientific criteria, such as taking into account the needs of a patient interest group or ensuring that there are economic benefits resulting from the research, but such a panel should not be given the caché of being a peer review.

But in general, the right people are asked to perform the demanding task of examining the work a colleague has submitted, and the vast majority of reviewers do a magnificent job. The extent to which a final paper has been improved by a referee's insistence that further controls must be performed, or that an alternative interpretation should be considered, should not be underestimated. Indeed, the very fact that the authors know that their work will be scrutinised raises the standard of a publication before it is even sent to a journal.

The benefits of peer review are real, whereas the alternative—giving up peer review in favour of a scientific 'freedom of expression'—would create many problems of its own. Novel findings or ideas might not move into the mainstream of our understanding of biological processes if they are viewed as simple statements from the discoverers, since peer review adds additional weight to claims that challenge our current understanding. Moreover, spectacular, but ultimately spurious, claims without the due process of peer review would confuse the public and raise expectations that eventually cannot be fulfilled, particularly in the biomedical sector. The consequences on society are real, as a false claim could give rise to erroneous treatments for patients or to unjustified movements in the stock market. And correcting the error by careful experimentation is a time-consuming and costly alternative.

The fact that peer review is the cornerstone of our scientific activities carries with it responsibilities as well as benefits. The editors of scientific journals know very well those scientists who are never available to review papers. Yet the same individuals are the first to complain if a review of their paper is late. If we believe that we are the correct arbiters of quality and want peer review to continue to maintain or even improve quality, then we have to devote some time to the process. Whether this should be paid or not could depend, in my view, on the publisher. If the publisher does not act for profit but rather recycles some of the income through society activities then reviewers should perform their work gratis for those journals as their work ultimately benefits their scientific community.

Peer reviewing is the manner in which we self-monitor our work. We should make sure that it remains an important factor in the whole process that transfers experiment into shared information by highlighting its benefits in a way that can be understood by the scientific community. To bypass or to diminish peer review may start a process that would eventually undermine the output of our research, allow the cynics to question its validity and give free rein to those that prefer their biases to results from well-controlled experimental investigations.

Frank Gannon

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